[0058] Base stations are typically controlled by at least one appropriate controller apparatus so as to enable operation thereof and management of mobile communication devices in communication with the base stations. In FIG. **1** control apparatus **108** and **109** is shown to control the respective macro level base stations **106** and **107**. The control apparatus of a base station can be interconnected with other control entities. The control apparatus is typically provided with memory capacity and at least one data processor. The control apparatus and functions may be distributed between a plurality of control units. In some systems, the control apparatus may additionally or alternatively be provided in a radio network controller.

[0059] In FIG. **1** base stations **106** and **107** are shown as connected to a wider communications network **113** via gateway **112**. A further gateway function may be provided to connect to another network.

[0060] The remote radio heads **116**, **118** and **120** are connected to a respective macro cell. Thus RRH **120** is connected to macro cell base station **106** and RRHs **118** and **116** are connected to macro cell base station **109**. The RRHs are located in the respective macro cell provided by the macro cell base station to which they are connected.

[0061] A possible mobile communication device will now be described in more detail with reference to FIG. **2** showing a schematic, partially sectioned view of a communication device **102**. Such a communication device is often referred to as user equipment (UE) or terminal. An appropriate mobile communication device may be provided by any device capable of sending and receiving radio signals. Non-limiting examples include a mobile station (MS) or mobile device such as a mobile phone or what is known as a 'smart phone', a computer provided with a wireless interface card or other wireless interface facility, personal data assistant (PDA) provided with wireless communication capabilities, or any combinations of these or the like. A mobile communication device may provide, for example, communication of data for carrying communications such as voice, electronic mail (email), text message, multimedia and so on. Users may thus be offered and provided numerous services via their communication devices. Non-limiting examples of these services include two-way or multi-way calls, data communication or multimedia services or simply an access to a data communications network system, such as the Internet. Users may also be provided broadcast or multicast data. Non-limiting examples of the content include downloads, television and radio programs, videos, advertisements, various alerts and other information.

[0062] The mobile device **102** may receive signals over an air interface **207** via appropriate apparatus for receiving and may transmit signals via appropriate apparatus for transmitting radio signals. In FIG. **2** transceiver apparatus is designated schematically by block **206**. The transceiver apparatus **206** may be provided for example by means of a radio part and associated antenna arrangement. The antenna arrangement may be arranged internally or externally to the mobile device.

[0063] A wireless communication device can be provided with a Multiple Input/Multiple Output (MIMO) antenna system. MIMO arrangements as such are known. MIMO systems use multiple antennas at the transmitter and receiver along with advanced digital signal processing to improve link quality and capacity. Although not shown in FIGS. **1** and **2**, multiple antennas can be provided, for example at base stations and mobile stations, and the transceiver apparatus **206** of FIG. **2** can provide a plurality of antenna ports. More data can be received and/or sent where there are more antenna elements. A station may comprise an array of multiple antennas. Signalling and muting patterns can be associated with TX antenna numbers or port numbers of MIMO arrangements.

[0064] A mobile device is typically provided with at least one data processing entity **201**, at least one memory **202** and other possible components **203** for use in software and hardware aided execution of tasks it is designed to perform, including control of access to and communications with access systems and other communication devices. The data processing, storage and other relevant control apparatus can be provided on an appropriate circuit board and/or in chipsets. This feature is denoted by reference **204**. The user may control the operation of the mobile device by means of a suitable user interface such as key pad **205**, voice commands, touch sensitive screen or pad, combinations thereof or the like. A display **208**, a speaker and a microphone can be also provided. Furthermore, a mobile communication device may comprise appropriate connectors (either wired or wireless) to other devices and/or for connecting external accessories, for example hands-free equipment, thereto.

[0065] FIG. **3** shows an example of a control apparatus for a communication system, for example to be coupled to and/or for controlling a station of an access system, such as a base station. In some embodiments, base stations comprise a separate control apparatus. In other embodiments, the control apparatus can be another network element such as a radio network controller. In some embodiments, each base station may have such a control apparatus as well as a control apparatus being provided in a radio network controller. The control apparatus **109** can be arranged to provide control on communications in the service area of the system. The control apparatus **109** comprises at least one memory **301**, at least one data processing unit **302**, **303** and an input/output interface **304**. Via the interface the control apparatus can be coupled to a receiver and a transmitter of the base station. For example the control apparatus **109** can be configured to execute an appropriate software code to provide the control functions.

[0066] The communication devices **102**, **103**, **105** may access the communication system based on various access techniques, such as code division multiple access (CDMA), or wideband CDMA (WCDMA). Other non-limiting examples comprise time division multiple access (TDMA), frequency division multiple access (FDMA) and various schemes thereof such as the interleaved frequency division multiple access (IFDMA), single carrier frequency division multiple access (SC-FDMA) and orthogonal frequency division multiple access (OFDMA), space division multiple access (SDMA) and so on.

[0067] An example of wireless communication systems are architectures standardized by the 3rd Generation Partnership Project (3GPP). A latest 3GPP based development is often referred to as the long-term evolution (LTE) of the Universal Mobile Telecommunications System (UMTS) radio-access technology. The various development stages of the 3GPP LTE specifications are referred to as releases. More recent developments of the LTE are often referred to as LTE Advanced (LTE-A). The LTE employs a mobile architecture known as the Evolved Universal Terrestrial Radio Access Network (E-UTRAN). Base stations of such systems are known as evolved or enhanced Node Bs (eNBs) and may provide E-UTRAN features such as user plane Radio Link Control/Medium Access Control/Physical layer protocol (RLC/MAC/PHY)